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Sexually transmitted infection testing and self-reported diagnoses among a community sample of men who have sex with men, in Scotland

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ABSTRACT

Introduction To examine sexually transmitted infection (STI) testing and self-reported diagnoses among men who have sex with men (MSM), in Scotland.

Methods Cross-sectional survey of seven Glasgow gay bars in July 2010 (n=822, 62% response rate); 693 are included in the analyses.

Results 81.8% reported ever having had an STI test; 37.4% had tested in the previous 6 months; 13.2% reported having an STI in the previous 12 months. The adjusted odds of having ever tested were significantly higher for men who had 6+ sexual partners in the previous 12 months (adjusted OR=2.66), a maximum sexual health knowledge score (2.23), and had talked to an outreach worker/participated in counselling (1.96), and lower for men reporting any high-risk unprotected anal intercourse (UAI) in the previous 12 months (0.51). Adjusted odds of recent testing were higher for men who had 6+ sexual partners (2.10), talked to an outreach worker/participated in counselling (1.66), maximum sexual health knowledge (1.59), and higher condom use knowledge (1.04), and lower for men aged ≥25 years (0.46). Adjusted odds of having had an STI in the previous 12 months were higher for men who had 6+ sexual partners (3.96) and any high-risk UAI in the previous 12 months (2.24) and lower for men aged ≥25 years (0.57).

Conclusions STI testing rates were relatively high, yet still below the minimum recommended for MSM at high risk. Consideration should be given to initiating recall systems for men who test positive for STIs, and to developing behavioural interventions which seek to address STI transmission.

INTRODUCTION

In addition to being the principal group at greatest risk of acquiring HIV in the UK,[1] men who have sex with men (MSM) are disproportionately affected by a range of sexually transmitted infections (STIs), particularly syphilis and gonorrhoea.[2] Increases in STI diagnoses have been widely reported, and have accompanied, and been associated with, increases in sexual risk behaviour and HIV testing among MSM since the 1990s.[3–7] The incidence, prevalence and testing behaviours associated with HIV have merited much more attention than those associated with other STIs. However, the European MSM Internet Survey (EMIS) reported that rates of STI testing in the previous 12 months were 44% in the UK sample, and ranged from 15% to 53% overall.[8] With moves to increase the frequency of, and essentially normalise, HIV testing among MSM (as part of regular sexual health screening), understanding the possible determinants of STI testing merits further attention.

At the UK level, there is inconsistency in guidance concerning the frequency of STI testing. Currently, the Health Protection Agency suggests that MSM have an HIV and STI screen at least annually, and more frequently if 'elevated risk' is reported.[2] However, the British Association for Sexual Health and HIV (BASHH) guidelines recommend testing up to every 3 months for people 'at highest risk' of HIV infection.[9] In Scotland, STI testing among MSM is advised to be repeated every 6–12 months for those 'at ongoing risk'.[10] Critically, there is no consensus concerning the parameters of how to define those at 'highest risk' or 'on-going risk'.

It is in this context that this paper addresses STI testing and experiences of risk. Identifying the factors associated with testing, and also experience of STIs, will enable more effective targeting of STI (and HIV) prevention efforts. We examine the factors associated with ever having had an STI test, recent STI testing, and, because of the high correlation between STI symptoms and testing behaviour, self-reported experience of STIs.

METHODS

The Make Your Position Clear (MYPC) mass media campaign aimed to promote regular sexual health and HIV testing every 6 months, and the use of appropriate condoms and water-based lubricant among gay and bisexual men in West Scotland. It ran from October 2009 to July 2010, and as part of its evaluation in July 2010, we conducted a cross-sectional survey of MSM from seven commercial gay bars in Glasgow using a form of time and location sampling. Bars were surveyed at two different time points, in the early (19:00–21:00) and late evening (21:00–23:00) hours. No bar was visited twice in the same evening. At the end of the survey, each bar had been visited at both time points on each day of the week. A team of temporary fieldworkers was trained and employed to distribute and collect anonymous, self-completed questionnaires in the bars. All men present or entering the venue were approached to complete a questionnaire. Ethical approval was granted by the psychology ethics subcommittee at Glasgow Caledonian University.

Questionnaires included demographics, sexual behaviour in the previous 12 months (number of

sexual, anal and unprotected anal intercourse (UAI) partners), HIV and STI testing history (including recency of testing), and experience of STIs in the previous 12 months. To avoid issues of overlap between groups within number of sexual partners and anal sex partners, number of sexual partners was considered to best represent the risk of STI transmission on the basis that most STIs can be transmitted or acquired through means other than just anal sex (eg, through oral sex) and was, therefore, used in lieu of anal sex partners. A measure of 'high-risk' UAI was created, and includes men who reported any one of the following three behaviours: UAI with two or more partners, UAI with casual partners and/or UAI with unknown/discordant partners in the previous 12 months. Respondents were asked about contact with health improvement interventions in the previous 12 months (picked up a sexual health leaflet in bar, club or sauna; looked for safer sex/sexual health information on the internet; obtained free condoms from a bar/club sauna or the internet; talked to an outreach worker in a bar/club or sauna; or participated in one-to-one or group counselling sessions on sexual health or HIV prevention).

Psychosocial factors relating to sexual health included measures of safer sex norms (eight items, higher score=stronger safer sex norms, α=0.61), an attitude and norm of contemporary condom use scale (10 items, higher score=stronger norm, α=0.82), and barebacking norms (four items, higher score=greater acceptance of barebacking, α=0.59). In all cases, a mean of contributing items was taken, with possible scores ranging from 1 to 5. Two knowledge scales were included in the questionnaire: knowledge relating to correct condom use, and knowledge relating to sexual health (primarily HIV/STI testing). The condom knowledge scale included eight items, and scores were computed for all respondents who had attempted at least seven of the eight questions (n=777). Scores ranged between −16 and +16, with a mean of 7.78 (SD=6.98). The sexual health knowledge scale was based on four items, and the overall score was computed in the same way as that for the condom knowledge scale. Respondents had to have attempted at least three out of the four items to be given a score (n=766), and scores ranged between −8 and +8. Since 70.8% (n=542) gained the maximum score, the variable was dichotomised for further analysis, and those who gained the maximum score were compared with those who did not. See appendix 1 for full description of the psychosocial and knowledge scales.

The sample consisted of 822 men (response rate 62.6%). Men with missing data on the STI testing variables, or who were not Scottish residents (n=129) were excluded from the analyses. For bivariate comparisons, χ^2 and t tests were used. Factors significant at the bivariate level (p value <0.05) were entered into three separate multivariate logistic regression models for STI testing (ever and in the previous 6 months) and STI experience using the default method (Forced Entry Method) in SPSS V.15.0 for Windows. These models adjusted for factors related to STI testing or experience, and were used to estimate OR and 95% CI. STI testing was dichotomised as follows: ever had an STI test (yes vs no); recency of STI test (less than 6 months ago vs. more than 6 months ago, or never). Number of sexual partners was dichotomised (0–5 vs 6+ partners), and HIV status was excluded because of the small numbers in the HIV-positive and untested categories.

RESULTS

Sample characteristics

Sample characteristics are shown in table 1. The average age of men sampled was 33 years (range 18–68, SD=10.35), and most

Table 1 Sample characteristics (n=693)

	N	%
STI testing and experience		
Ever had STI test		
Never had STI test	126	18.2
Had STI test	567	81.8
Recency of STI test		
In the previous 6 months	259	37.4
Between 6 and 12 months ago	115	16.6
Over 12 months ago	193	27.8
Never had an STI test	126	18.2
STI		
Not had STI in previous 12 month	594	86.8
Had STI in previous 12 months	90	13.2
Demographics		
Age		
<25 years	195	28.3
25+ years	493	71.7
Frequency of gay scene use		
Once a month or less	156	22.7
2–3 times a month	211	30.7
Once or more a week	321	46.7
Employment		
Employed or self-employed	550	79.6
Unemployed, student, retired	141	20.4
Area of residence		
Rest of Scotland	141	20.3
Glasgow	552	79.7
Education		
Secondary	120	17.5
Further/vocational	296	43.2
Degree/postgraduate	269	39.3
HIV status		
HIV tested and HIV-positive	21	3.3
HIV tested and HIV-negative	477	75.4
Never been tested	135	21.3
Sexual behaviour in the previous 12 months		
Number of sexual partners		
0 or 1 partner	199	29.8
2–5 partners	247	37.0
6–10 partners	92	13.8
11+ partners	129	19.3
Any high-risk UAI		
No	444	64.1
Yes	249	35.9
Contact with sexual health promotion in the previous 12 months		
Obtained free condoms from a bar/club sauna or the internet		
No	157	23.2
Yes	520	76.8
Picked up a sexual health leaflet in a bar/club/sauna, or looked for safer sex/sexual health information on the internet		
No	329	48.7
Yes	346	51.3
Talked to an outreach worker in a bar/club or sauna or participated in one-to-one or group counselling sessions on sexual health or HIV prevention		
No	515	76.3
Yes	160	23.7
Sexual health and condom use knowledge		
Sexual health knowledge		
Less than maximum score	197	29.0
Maximum score	482	71.0

Continued

Table 1 Continued

	N	%
	Mean	SD
Condom use knowledge	7.74	7.02
Norms		
Barebacking norm	2.54	0.89
Attitudes and norms towards contemporary condom use (ANCCU)	3.82	0.77
Safer sex norms	3.75	0.81

ANCCU, attitude and norm of contemporary condom use scale; STI, sexually transmitted infection; UAI, unprotected anal intercourse.

men visited the gay scene at least once a week. The majority were employed and educated beyond secondary level. Most were sexually active, and more than one-third reported any high-risk UAI in the previous 12 months. The majority reported that they were HIV-negative, and just over one in five had never been tested. Having obtained free condoms from a bar, club or the internet was the most frequently reported sexual health promotion activity, and most men surveyed had high sexual health and condom knowledge scores.

STI testing and experience

Overall, 567 men (81.8%) reported ever having had an STI test. Only a little more than one-third of men had tested in the previous 6 months, while 16.6% had tested between 6 and 12 months ago, and 27.8% had tested over 12 months ago (table 1); 13.2% reported having had an STI in the previous 12 months.

STI testing was found to be highly associated with HIV testing. Among men who reported having had an STI test, 93.6% also reported having had an HIV test: (χ^2=344.76, p<0.001); 88.2% (n=224) of men who had an STI test in the previous 6 months had had an HIV test in the previous 6 months (χ^2=391.85, p<0.001), and 91.3% (n=335) of men who had had an STI test in the previous 12 months had had an HIV test in the previous 12 months (χ^2=369.62, p<0.001).

Factors associated with STI testing and STI experience

Tables 2–4 show the factors associated with STI testing and experience. The likelihood of ever having had an STI test was higher for men who: were aged ≥25 years; were educated to degree/postgraduate level; reported 6+ sexual partners and no high-risk UAI; picked up a sexual health leaflet in a bar, club or sauna, or looked for sex/sexual health information on the internet; talked to an outreach worker in a bar, club or sauna, or participated in one-to-one or group counselling sessions on sexual health or HIV prevention; had a high sexual health and condom knowledge; and had stronger condom norms (table 2).

The likelihood of having an STI test in the previous 6 months was higher for men who: were aged <25 years; were unemployed, a student, or retired; reported 6+ sexual partners; talked to an outreach worker or participated in counselling; and had high sexual health and condom knowledge (table 3).

The likelihood of reporting an STI in the previous 12 months was higher for men who: were aged <25 years; visited the gay scene at least once week; reported 6+ sexual partners and high-risk UAI; had greater acceptance of barebacking and weaker condom norms (table 4).

In multivariate analysis, the odds of ever having had an STI test remained significantly higher for men who had 6+ sexual partners in the previous 12 months compared with men who had 0–5 partners, men who had a maximum sexual health knowledge score compared with men who had less than a maximum score, and men who talked to an outreach worker or participated in counselling on sexual health of HIV prevention. The odds were significantly lower for men who had reported any high-risk UAI in the previous 12 months (table 2).

The adjusted odds of having had an STI test in the previous 6 months remained significantly higher for men who had 6+ sexual partners in the previous 12 months, men who had talked to an outreach worker or participated in counselling on sexual health or HIV prevention, men who had a maximum sexual health knowledge score compared with men who had less than the maximum score, and men who had higher condom use knowledge (table 3). By contrast, the odds of having an STI test in the previous 6 months were lower for men who were aged ≥25 years.

The adjusted odds of having had an STI in the previous 12 months were higher for men who had 6+ sexual partners and any high-risk UAI in the previous 12 months, and lower for men who were aged ≥25 years (table 4).

Men aged <25 years were more likely to report high-risk UAI (χ^2=5.59, p=0.018), but there was no significant interaction between age and UAI in any of the regression models.

DISCUSSION

The majority of MSM who took part in the survey had had an STI test at some point in their lives, while one-third had tested in the previous 6 months; just over one in 10 had had an STI in the previous 12 months. Such high recent STI testing rates are not commonly reported, but one US study found 63.8% of MSM surveyed had tested in the previous 6 months,[11] while a study of primary care clinics in Melbourne, Australia, found 6 monthly retesting rates of only 15% among higher-risk MSM.[12] The EMIS Survey reported that rates of STI testing in the previous 12 months ranged from 15% in Slovakia to 53% in The Netherlands (44% in the UK);[8] this compares with 70% in the Australian Gay Community Periodic Surveys.[13] Rates of ever testing were also considerably lower in the Scottish and English samples of EMIS than in our survey (62% and 71%, respectively).[14 15]

First, some limitations of our data should be considered. It is important to note that only men who visited the venues surveyed had the opportunity to participate, and caution should be taken when generalising to the wider population of MSM. The anonymous nature of the survey prevents identification of men who could have completed the questionnaire more than once, but this is thought unlikely given the short timeframe of data collection and the training of fieldworkers to avoid this. Recall and reporting biases could affect underestimating or overestimating of actual levels of STI testing and experience. These analyses do not (and cannot) show whether the STI tests reported here are regular or frequent events, or whether they are proactively chosen as part of a sexual health screen, or are responsive to symptoms of STIs. Finally, the cross-sectional nature of the data precludes any analysis of causality.

Although the chance of having ever had an STI test increases over the life course, younger men (aged <25 years) were most likely to have had an STI test in the previous 6 months. They were also most likely to have had an STI in the previous 12 months (it remains unclear whether this correlation can be explained by opportunistic screening resulting in diagnosis of asymptomatic infection, or whether symptoms led to testing, although it should be noted that there is no opportunistic screening programme for chlamydia among young men in

Table 2 Factors associated with ever having had an STI test among MSM in Scotland: n, %, unadjusted and multivariate logistic regression

	Never had an STI test (n=126) n (%)	Had an STI test (n=567) n (%)	OR	95% CI	p Value	AOR (n=594)	95% CI	p Value
Demographics								
Age								
<25	45 (23.1)	150 (76.9)	1			1		
25+	81 (16.4)	412 (83.6)	1.53	(1.01 to 2.30)	0.043	1.21	(0.74 to 1.97)	0.447
Frequency of gay scene use								
Once a month or less	29 (18.6)	127 (81.4)	1		0.502			
2–3 times a month	33 (15.6)	178 (84.4)	1.23	(0.71 to 2.13)				
Once or more a week	63 (19.6)	258 (80.4)	0.94	(0.57 to 1.52)				
Employment								
Employed or self-employed	98 (17.8)	452 (82.2)	1					
Unemployed, student, retired	28 (19.9)	113 (80.1)	0.88	(0.55 to 1.40)	0.576			
Area of residence								
Rest of Scotland	33 (23.4)	108 (76.6)	1					
Glasgow	93 (16.8)	459 (83.2)	1.51	(0.96 to 2.36)	0.730			
Education								
Secondary	24 (20.0)	96 (80.0)	0.64	(0.36 to 1.12)		0.69	(0.35 to 1.37)	
Further/vocational	64 (21.6)	232 (78.4)	0.58	(0.37 to 0.90)		0.57	(0.34 to 0.95)	
Degree/postgraduate	37 (13.8)	232 (86.2)	1		0.048	1		0.096
HIV status*								
HIV tested and HIV positive	0 (0.00)	21 (100.0)						
HIV tested and HIV negative	20 (4.2)	457 (95.8)						
Never been tested	99 (73.3)	36 (26.7)						
Sexual behaviour in the previous 12 months.								
Number of sexual partners								
0–5 partners	96 (21.5)	350 (78.5)	1			1		
6+ partners	26 (11.8)	195 (88.2)	2.06	(1.29 to 3.28)	0.002	2.66	(1.58 to 4.50)	<0.001
Had any high-risk UAI								
No	66 (14.9)	378 (85.1)	1			1		
Yes	60 (24..1)	189 (75.9)	0.55	(0.37 to 0.81)	0.003	0.51	(0.32 to 0.81)	0.004
Contact with sexual health promotion in the previous 12 months.								
Obtained free condoms from a bar/club sauna or the internet								
No	29 (18.5)	128 (81.5)	1					
Yes	94 (18.1)	426 (81.9)	1.03	(0.65 to 1.63)	0.911			
Picked up a sexual health leaflet in a bar/club/sauna, or looked for safer sex/sexual health information on the internet								
No	70 (21.3)	259 (78.7)	1			1		
Yes	53 (15.3)	293 (84.7)	1.49	(1.01 to 2.22)	0.046	1.1	(0.69 to 1.77)	0.682
Talked to an outreach worker in a bar/club or sauna, or participated in one-to-one or group counselling sessions on sexual health or HIV prevention								
No	105 (20.4)	410 (79.6)	1			1		
Yes	17 (10.6)	143 (89.4)	2.15	(1.25 to 3.72)	0.006	1.96	(1.02 to 3.77)	0.044
Sexual health and condom use knowledge.								
Sexual health knowledge score								
Less than maximum score	60 (30.5)	137 (69.5)	1			1		
Maximum score	62 (12.9)	420 (87.1)	2.97	(1.98 to 4.44)	<0.001	2.23	(1.38 to 3.61)	0.001
	Mean (SD)	Mean (SD)						
Condom knowledge	5.58 (7.57)	8.21 (6.82)	1.05	(1.02 to 1.08)	<0.001	1.01	(0.98 to 1.04)	0.602
Norms								
Mean of barebacking items	2.61 (0.92)	2.52 (0.89)	0.89	(0.71 to 1.11)	0.304			
ANCCU norm scale	3.67 (0.78)	3.85 (0.76)	1.33	(1.04 to 1.69)	0.023	1.26	(0.93 to 1.70)	0.132
Safer sex scale	3.71 (0.85)	3.76 (0.79)	1.08	(0.84 to 1.38)	0.554			

*Not included in univariate and multivariate analyses because of inadequate cell counts.
ANCCU, attitude and norm of contemporary condom use scale; AOR, adjusted OR; MSM, men who have sex with men; STI, sexually transmitted infection; UAI, unprotected anal intercourse.

Scotland). Second, a clear pattern was observed in relation to sexual behaviour. Increased STI testing and diagnosis were observed among men reporting higher numbers of sexual partners in the previous 12 months; a finding also reported elsewhere.[12 16] The associations between sexual risk behaviour, testing and diagnosis are to some extent reassuring; those at risk are also the ones who are testing most often, perhaps because they have acquired STIs. However, with only around half of those at highest risk reporting testing in the previous 6 months, and men who reported high-risk UAI being less likely to have ever tested (but more likely to have tested positive for STIs), there is still some way to go to meet the minimum testing levels being recommended for MSM at risk,[9 10] particularly the every 3 months being recommended by

Table 3 Factors associated with having had an STI test in the previous 6 months among MSM in Scotland: n, %, unadjusted and multivariate logistic regression

	Not had a recent test (n=434) n (%)	Had a recent test(n=259) n (%)	OR	95% CI	p Value	AOR (n=623)	95% CI	p Value
Demographics								
Age								
<25	100 (51.3)	95 (48.7)	1			1		
25+	330 (66.9)	163 (33.1)	0.52	(0.37–0.73)	<0.001	0.46	(0.32–0.68)	<0.001
Frequency of gay scene use								
Once a month or less	103 (66.0)	53 (34.0)	1		0.265			
2–3 times a month	136 (64.5)	75 (35.5)	1.07	(0.69–1.66)				
Once or more a week	190 (59.2)	131 (40.8)	1.34	(0.90–2.00)				
Employment								
Employed or self-employed	358 (65.1)	192 (34.9)	1			1		
Unemployed, student, retired	76 (53.9)	65 (46.1)	1.60	(1.1–2.32)	0.015	1.48	(0.97–2.25)	0.068
Area of residence								
Rest of Scotland	89 (63.1)	52 (36.9)	1					
Glasgow	345 (62.5)	207 (37.5)	1.03	(0.7–1.51)	0.892			
Education								
Secondary	78 (65.0)	42 (35.0)	0.82	(0.52–1.28)				
Further/vocational	189 (63.9)	107 (36.1)	0.86	(0.61–1.21)				
Degree/Postgraduate	162 (60.2)	107 (39.8)	1		0.565			
HIV status*								
HIV tested and HIV positive	8 (38.1)	13 (61.9)						
HIV tested and HIV negative	272 (57.0)	205 (43.0)						
Never been tested	128 (94.8)	7 (5.2)						
Sexual behaviour in the previous 12 months.								
Number of sexual partners								
0–5 partners	307 (68.8)	139 (31.2)	1			1		
6+ partners	114 (51.6)	107 (48.4)	2.07	(1.49–2.89)	<0.001	2.10	(1.47–2.99)	<0.001
Had any high-risk UAI								
No	277 (62.4)	167 (37.6)	1					
Yes	157 (63.1)	92 (36.9)	0.97	(0.71–1.34)	0.862			
Contact with sexual health promotion in the previous 12 months.								
Obtained free condoms from a bar/club sauna or the internet								
No	105 (66.9)	52 (33.1)	1					
Yes	317 (61.0)	203 (39.0)	1.29	(0.89–1.88)	0.181			
Picked up a sexual health leaflet in a bar/club/sauna, or looked for safer sex/sexual health information on the internet								
No	213 (64.7)	116 (35.3)	1					
Yes	208 (60.1)	138 (39.9)	1.22	(0.89–1.67)	0.215			
Talked to an outreach worker in a bar/club or sauna, or participated in one-to-one or group counselling sessions on sexual health or HIV prevention								
No	338 (65.6)	177 (34.4)	1			1		
Yes	83 (51.9)	77 (48.1)	1.77	(1.24–2.54)	0.002	1.66	(1.11–2.49)	0.014
Sexual health and condom use knowledge.								
Sexual health knowledge score								
Less than maximum score	143 (72.6)	54 (27.4)	1			1		
Maximum score	280 (58.1)	202 (41.9)	1.91	(1.33–2.74)	<0.001	1.59	(1.05–2.42)	0.029
	Mean (SD)	Mean (SD)						
Condom knowledge	7.03 (7.07)	8.89 (6.81)	1.04	(1.02–1.07)	0.001	1.04	(1.01–1.06)	0.011
Norms								
Mean of barebacking items	2.52 (0.88)	2.57 (0.91)	1.07	(0.90–1.28)	0.447			
ANCCU norm scale	3.82 (0.71)	3.82 (0.86)	1.00	(0.81–1.23)	0.993			
Safer sex scale	3.73 (0.81)	3.79 (0.80)	1.10	(0.90–1.34)	0.344			

*Not included in univariate and multivariate analyses because of inadequate cell counts.
ANCCU, attitude and norm of contemporary condom use scale; AOR, adjusted OR; MSM, men who have sex with men; STI, sexually transmitted infection; UAI, unprotected anal intercourse.

BASHH.[9] Consideration should be given to initiating recall systems for men who test positive for STIs, and to promoting the uptake of regular opportunistic testing among those who have previously reported an STI. For instance, a recent UK study found such a system feasible, achieving high rescreening rates and identification of incident infections,[17] while an Australian study found short message service reminders increased retesting among MSM.[18] Equally, the use of venue-based testing (including those places and spaces in which men meet for sex) should be encouraged.[19]

Table 4 Factors associated with having had an STI in the previous 12 months among MSM in Scotland: n, %, unadjusted and multivariate logistic regression

	Did not have an STI in previous 12 months (n=594) n (%)	Had an STI in previous 12 months (n=90) n (%)	OR	95% CI	p value	AOR (n=620)	95% CI	p Value
Demographics								
Age								
<25	155 (81.2)	36 (18.8)	1			1		
25+	435 (89.1)	53 (10.9)	0.53	(0.33–0.83)	0.006	0.57	(0.34–0.97)	0.037
Frequency of gay scene use								
Once a month or less	143 (92.9)	11 (7.1)	1		0.010	1		0.146
2–3 times a month	184 (88.5)	24 (11.5)	1.70	(0.80–3.58)		1.48	(0.65–3.35)	
Once or more a week	263 (83.0)	54 (17.0)	2.67	(1.35–5.27)		2.06	(0.96–4.41)	
Employment								
Employed or self-employed	476 (87.7)	67 (12.3)	1					
Unemployed, student, retired	117 (84.2)	22 (15.8)	1.34	(0.79–2.25)	0.277			
Area of residence								
Rest of Scotland	125 (89.9)	14 (10.1)	1					
Glasgow	469 (86.1)	76 (13.9)	1.45	(0.79–2.65)	0.230			
Education								
Secondary	97 (84.3)	18 (15.7)	1.27	(0.68–2.35)				
Further/vocational	258 (87.5)	37 (12.5)	0.98	(0.60–1.61)				
Degree/postgraduate	232 (87.2)	34 (12.8)	1		0.686			
HIV status*								
HIV tested and HIV positive	16 (76.2)	5 (23.8)						
HIV tested and HIV negative	401 (84.8)	72 (15.2)						
Never been tested	127 (95.5)	6 (4.5)						
Sexual behaviour in the previous 12 months.								
Number of sexual partners								
0–5 partners	408 (92.5)	33 (7.5)	1			1		
6+ partners	164 (75.2)	54 (24.8)	4.07	(2.55–6.51)	<0.001	3.96	(2.34–6.71)	<0.001
Had any high-risk UAI								
No	403 (91.6)	37 (8.4)	1			1		
Yes	191 (78.3)	53 (21.7)	3.02	(1.92–4.76)	<0.001	2.24	(1.32–3.81)	0.003
Contact with sexual health promotion in the previous 12 months.								
Obtained free condoms from a bar/club sauna or the internet								
No	140 (90.9)	14 (9.1)	1					
Yes	442 (85.8)	73 (14.2)	1.65	(0.90–3.02)	0.103			
Picked up a sexual health leaflet in a bar/club/sauna, or looked for safer sex/sexual health information on the internet								
No	277 (85.2)	48 (14.8)	1					
Yes	305 (89.2)	37 (10.8)	0.70	(0.44–1.12)	0.128			
Talked to an outreach worker in a bar/club or sauna, or participated in one-to-one or group counselling sessions on sexual health or HIV prevention								
No	446 (88.0)	61 (12.0)	1					
Yes	134 (83.8)	26 (16.3)	1.42	(0.86–2.33)	0.169			
Sexual health and condom use knowledge.								
Sexual health knowledge score								
Less than maximum score	167 (86.5)	26 (13.5)	1					
Maximum score	418 (87.1)	62 (12.9)	0.95	(0.58–1.56)	0.847			
	Mean (SD)	Mean (SD)						
Condom knowledge	7.74 (6.88)	7.65 (8.12)	1.00	(0.97–1.03)	0.907			
Norms								
Mean of barebacking items	2.48 (0.87)	2.86 (0.98)	1.59	(1.24–2.05)	<0.001	1.08	(0.75–1.56)	0.669
ANCCU norm scale	3.87 (0.73)	3.56 (0.92)	0.63	(0.48–0.83)	0.001	0.67	(0.45–1.00)	0.053
Safer sex scale	3.76 (0.79)	3.69 (0.87)	0.90	(0.68–1.19)	0.453			

*Not included in univariate and multivariate analyses because of inadequate cell counts.
ANCCU, attitude and norm of contemporary condom use scale; AOR, adjusted OR; MSM, men who have sex with men; STI, sexually transmitted infection; UAI, unprotected anal intercourse.

Ever and recent STI testing were higher among men with greater levels of sexual health knowledge, suggesting a possible association between testing and what could be termed 'sexual health literacy'. Recent testing was also higher among men who reported that they had talked to an outreach worker or participated in one-to-one or group counselling on sexual health or HIV prevention in the previous 12 months. Although causality cannot be assessed, this suggests continuing engagement with sexual health promotion should remain a key component of combination approaches to prevention. It is

important to note that the data reported in this paper were collected as part of an evaluation of the MYPC mass media campaign, aimed at promoting positive sexual health behaviours in MSM. Indeed, MYPC was the latest in a series of health improvement campaigns aimed at increasing STI and HIV testing among MSM in Scotland, and the recent increases in HIV testing,[6 7] and the now relatively high proportions reporting recent STI (and HIV[20]) testing, could reflect the effectiveness of these campaigns. However, the causality of such associations cannot be assessed, and a recent Cochrane review concluded there was little evidence of an increase in STI testing from social marketing campaigns with MSM.[21] Although norms for condom use did not remain significant in the multivariate models for ever having an STI test and having had an STI, it is critical that we consider and understand how the effectiveness of interventions is mediated by, or dependent upon, normative factors at the community level.[22]

There was a strong association between STI and HIV testing, and it is important to consider the secondary use of sexual health screening as a means of facilitating opportunities for HIV testing (with HIV-negative men) and prevention (with HIV-positive and HIV-negative men). General sexual health testing could offer a means of increasing the frequency and uptake of HIV testing (since HIV testing is routinely being offered within sexual health screening), potentially vital to the success of biomedical interventions such as treatment as a prevention,[23] if these were to be widely adopted. Equally regular STI testing among HIV-positive men should also be thought of as a core component of treatment as prevention; coinfection with STIs is known to increase infectivity among people living with HIV, even among those on antiretroviral treatment (ART).[2]

From a prevention viewpoint, it is important to develop and evaluate a range of interventions which focus upon STI testing, and develop a more nuanced appreciation of the similarities and differences between behaviours associated with HIV and other STIs. Areas of divergence may be a useful starting point, such as examining those who test for STIs but opt out of HIV testing, or in contrast, considering STI-specific sexual and health behaviours, such as oral sex, numbers of sexual partners, anilingus, vaccination uptake, adherence to antibiotics and antivirals, and attendance at repeat clinical visits (for test of cure). Equally in terms of convergence, there is increasing scope to explore the transferability of interventions relating to HIV testing to that of STI testing, and to develop behavioural interventions which seek to address STI transmission (rather than testing per se).

Key messages

- In a survey of men who have sex with men, in Glasgow, most men had had a sexually transmitted infection (STI) test at some point across their sexual careers, and over one-third had tested in the previous 6 months.
- Younger men, those with higher numbers of sexual partners and greater sexual health literacy were more likely to have tested recently.
- Recall systems for those who test positive for STIs should be explored.
- The use of sexual health screening as a means of facilitating opportunities for frequent HIV testing and HIV prevention demands further research.

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Notes